

Chapter 4 - Environmental Consequences

In this Chapter:

- Specific impacts from BPA's alternatives
- Specific impacts from the proposed wind projects
- Proposed mitigation
- Cumulative impacts
- Comparison of alternatives

This chapter discusses the potential impacts of BPA's alternatives and the proposed wind projects on the environment. To analyze potential impacts from construction, operation and maintenance activities, resource specialists analyzed actions using a scale with four impact levels: **high**, **moderate**, **low** and **no** impact. Definitions of the impact levels vary for each resource. Most impact definitions are given in the first part of each resource discussion. The level of detail for each affected resource depends on the character of that resource, the importance of the issue, and the scale of analysis most relevant for the affected resource. Additional detail and maps can be found in appendices.

Specialists considered direct and indirect impacts in the short and long term. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Impacts can be beneficial or adverse. The impact discussion lists **mitigation** that could reduce impacts.

This chapter also includes the potential **cumulative impacts** of the alternatives under each of the resources evaluated in this chapter. Cumulative impacts are the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions. Foreseeable future actions can be undertaken by federal or non-federal entities. Cumulative impacts also can result from individually minor but collectively significant actions taking place over a period of time. The following describes the various actions considered in the cumulative impact analyses in this chapter.

Although much of the project vicinity has remained as undeveloped rangeland, agricultural and other rural development has occurred in the area in the past two centuries. Typical past development includes large grain farms, irrigated row crop farms, specialty crop enterprises such as orchards and vineyards, and small rural communities. Various types of roads and utility infrastructure also have been developed in the area. This type of development continues in present times and likely will continue into the future. A more recent type of development to occur in the area has been wind farms. Examples include the Klondike I and II wind farms, as well as the Condon wind farm.

Due to its rural nature, there is limited current or proposed future development activity in the general project area of the proposed projects. Typical activity includes

road construction, housing development, and some commercial and industrial expansion. However, most of the current or future development expected to occur involves wind farms that are already under construction, are approved but not yet constructed, or are proposed and currently undergoing some type of permitting process. Table 4-1 identifies these reasonably foreseeable future actions. Past experience with proposed wind projects has shown that it is likely that not all of these wind farms will ultimately be developed, but full development is nonetheless assumed for purposes of the cumulative impact analyses in this chapter.

No other major projects or actions are known to be underway or planned in Sherman, Wasco, Gilliam, and Klickitat (Washington) counties (Mcnab, 2006b; Baird, 2006; Anderson, 2006; Dreyer, 2006; Deal, 2006).

In Morrow County, Oregon, proposed development other than wind farms includes a 1,500-acre NASCAR facility proposed for north-central Morrow County near Tower Road; a new potato processing facility; a 120-acre methane digester to burn methane and produce 10 MW of electricity; and two new ethanol plants (McLane, 2006).

Table 4-1 Existing, Planned and Reasonably Foreseeable Wind Projects in the Project Vicinity

Wind Projects		
Regional Projects	MW	Oregon County (unless noted)
Seven Mile Hill	70	Wasco
Windy Point	250	Klickitat, Washington
Klondike I	24	Sherman
Klondike II	75	Sherman
Klondike III	300	Sherman
Biglow Canyon	400	Sherman
Oregon Trail	15	Sherman
Goodhoe Hills	150	Klickitat, Washington
Big Horn	200	Klickitat, Washington
White Creek	200	Klickitat, Washington
Condon	50	Gilliam
Leaning Juniper	200	Gilliam
Arlington CEP	100	Gilliam
Orion South	200	Sherman
Shepherds Flat	750	Gilliam and Morrow
Willow Creek	150	Gilliam and Morrow
Total	3,134	

4.1 Land Use

4.1.1 Impact Levels

Impacts would be considered **high** where actions would:

- Involve acquisition of new land or land easements for facilities that would preclude existing or planned use of land in an area not previously directly affected by the presence of utility facilities.
- Convert active and productive farmlands to a non-farm land use in excess of 3 percent of agricultural land in the county.
- Displace residents by causing in excess of five homes to be removed.

Impacts would be considered **moderate** where actions would:

- Involve acquisition of new land or land easements for facilities that would preclude existing or planned use of land in an area already affected by the presence of utility facilities.
- Adversely affect existing farmlands from 2 to 3 percent of agricultural lands county-wide.
- Displace some households (five or less) and residents who choose to move because of land use changes.

Impacts would be considered **low** where actions would:

- Involve acquisition of new land or land easements for utility facilities that would result in an adjustment of established or planned use of land.
- Convert active and productive farmlands to non-farm use in less than 1 percent of the agricultural lands within the county.
- Create short-term disturbances (such as crop damage during construction), but still allow the continued use of the land according to existing farm practices.
- Displace no residents.

No impact would occur when land uses would not change.

4.1.2 BPA Proposed Action

4.1.2.1 Impacts

The Proposed Action would be located entirely within land zoned F-1 (Exclusive Farm Use). BPA would acquire 125-foot wide easements to build, operate and maintain the transmission line from the proposed John Day 230-kV Substation to PPM's existing Klondike Schoolhouse Substation. BPA would purchase 15 acres in fee for the proposed John Day 230-kV Substation. BPA would also purchase easements for access roads.

Permanent Impacts

The proposed transmission line is about 12 miles long. Transmission line towers would be placed about 900 feet apart, requiring about 71 towers (61 steel tubes, 10 steel lattice). Each steel tube tower would require 225 square feet (15 feet by 15 feet) while each lattice tower would require about 5,000 square feet (about 70 feet by 70 feet) of land per tower. Because steel lattice towers require more land, their use would have a greater adverse impact to farming practices. They are also more expensive to construct. As a result, steel tube towers would be used wherever possible. Steel lattice towers would only be used for angle points or dead ends.

All rock and soil materials used for excavating the area for footings would be later used to backfill the excavated area once the footings are installed. Land within the 125-foot wide easement unaffected by constructing the towers and substation would remain open and available for farming. No residences would be removed or permanently affected by the Proposed Action. Wherever feasible, the transmission lines would be placed along the margins of cultivated areas to reduce the potential for conflict with farm operations. Overall, the towers would permanently affect about 1.5 acres.

Expansion of the John Day Substation would permanently affect about 0.1 acre of land classified as F-1 farmland. This land is not being farmed. The proposed 230-kV John Day Substation would require about 15 acres of F-1 farmland (see Table 4-2).

Table 4-2 Land Use Impacts

Type of Disturbance	BPA Proposed Action	BPA Middle Alternative	BPA No Action Alternative	Klondike III Wind Project	Biglow Canyon Wind Farm
Temporary Impacts (acres)					
Roads/Staging	51.00	52.0	0.00	240.21	112.78
Towers/Turbines	65.19	67.95	0.00	46.90	274.47
Substations/O&M Facilities	0.00	0.00	0.00	8.00	6.00
Total	116.19	119.95	0.00	295.1	393.25
Permanent Impacts (acres)					
Roads/Staging	0.00	0.00	0.00	43.1	151.99
Towers/Turbines	1.46	1.53	0.00	12.0	14.58
Substations/O&M Facilities	15.10	15.10	0.00	19.7	11.11
Total	16.56	16.63	0.00	74.8	177.68

No permanent roads would be constructed as part of the Proposed Action.

During the life of the proposed project, BPA would perform routine, periodic maintenance and emergency repairs to the transmission line. Little vegetation maintenance is anticipated because the analysis area is mostly farmed. If necessary, BPA would coordinate with local farmers to reduce the risk of impacts to farming practices along its transmission rights-of-way prior to any vegetation maintenance. Vegetation maintenance is described in Section 2.1.13, Maintenance.

Permanent impacts to land use from the Proposed Action would total about 16.6 acres. This would be a low impact because total acreage taken out of production would account for less than 1 percent of total farmland within Sherman County.

Temporary Impacts

Temporary construction-related impacts would include disturbance to areas surrounding tower and substation construction sites and temporary road construction.

Constructing each tower would disturb an area about 40,000 square feet (200 feet by 200 feet), temporarily affecting about 65.2 acres. This land would be restored to pre-project conditions when construction is completed.

BPA would use the existing road system as much as possible for construction, although temporary access would be necessary for construction at each tower site. Most of the access roads would be within the transmission line ROW. About 50.7 acres would be temporarily disturbed for construction of temporary roads and a staging area (about 10 acres). The location for the staging area would be determined prior to construction and it would likely be located next to a highway or main road, and would only be used prior to and during construction. If construction were to occur during the dry season, little or no gravel would be required for temporary access roads. Any construction access roads needed would be about 14 feet wide and would be removed after construction. Ground disturbed for temporary roads would be restored to its pre-construction condition after construction is completed.

If crop damage were to occur during construction or during periodic maintenance, landowners would be compensated for damaged or lost crops. Access road locations would be coordinated with landowners and ODOT or Sherman County (depending on the road) to the extent practicable, to minimize impacts on traffic, property and existing uses.

In the short term, farm revenues could be adversely affected to the extent that disruptions could cause delays in harvesting, more time needed to move equipment, and interruptions to harvesting patterns. These impacts would be temporary and farmers would be compensated for the loss of revenue from land affected by construction.

Overall, temporary land use impacts from the Proposed Action would total about 116 acres and represent a low impact.

4.1.2.2 Mitigation Measures

BPA would compensate landowners through perpetual easements for the transmission line ROW and access roads, and purchase the land in fee for the substation site. BPA would compensate landowners for any crop damage that occurs during construction, and operation and maintenance.

4.1.3 BPA Middle Alternative

4.1.3.1 Impacts

The Middle Alternative would be about 12.5 miles long and except for the different route, would have similar components to the Proposed Action and similar impacts.

Permanent Impacts

As with the Proposed Action, the Middle Alternative would be entirely located on land zoned F-1 (Exclusive Farm Use) (EFU) and would require a 125-foot wide easement. Transmission line towers would be placed about 1,000 feet apart, which would require about 74 towers (64 steel tube, 10 steel lattice). Overall, construction of the transmission line would permanently affect about 1.5 acres, similar to the Proposed Action. Unlike the Proposed Action, the Middle Alternative would cross some fields and could affect harvesting patterns around the towers, although land within the 125-foot wide easement unaffected by constructing the towers and substations would remain open for farming. No residences would be removed or permanently affected by the Middle Alternative. Wherever feasible, the transmission lines would be placed along the margins of cultivated areas to reduce the potential for conflict with farm operations. Expansion of the John Day Substation would affect about 0.30 acre of F-1 farmland, though this land is not now being farmed. The proposed 230-kV John Day Substation would require about 10 acres of F-1 farmland. The substations would permanently affect about 15 acres, the same as the Proposed Action.

Similar to the Proposed Action, no permanent roads would be constructed.

Permanent impacts to land use from the Middle Alternative would total about 16.6 acres, similar to the Proposed Action. This would be a low impact because total acreage taken out of production would account for less than 1 percent of total farmland within Sherman County.

Temporary Impacts

Constructing each tower would disturb an area about 40,000 square feet (200 feet by 200 feet), temporarily affecting about 68 acres, although this land would be restored to pre-project conditions when construction is completed.

BPA would use the existing road system as much as possible for construction, although temporary access would be necessary for construction at each tower site. About 120 acres of land would be temporarily disturbed for construction of temporary

roads and staging areas. As with the Proposed Action, temporary construction-related impacts would include a 10-acre staging area needed for transmission line construction and the stockpiling of materials.

As with the Proposed Action, adverse short-term impacts to farm revenues could occur to the extent that disruptions could cause delays in harvesting, more time could be needed to move equipment and could cause temporary interruptions to harvesting patterns. These impacts would be temporary and farmers would be compensated for the loss of revenue from land affected by construction.

Overall, temporary land use impacts from the Middle Alternative would total about 120 acres, slightly more than the Proposed Action, and represent a low impact.

4.1.3.2 Mitigation Measures

BPA would compensate landowners through perpetual easements for the transmission line ROW and access roads, and purchase the land in fee for the substation site. BPA would compensate landowners for any crop damage that occurs during construction, and operation and maintenance.

4.1.4 BPA No Action Alternative

The No Action Alternative would have no impact to land use because no new substation, substation expansion or transmission line would be constructed. Existing land uses would remain the same as today.

4.1.5 Klondike III Wind Project

4.1.5.1 Impacts

Permanent Impacts

Permanent land use impacts would consist of replacing farmed land with the utility use (including roads to access the turbine strings) and forced changes in harvesting patterns to avoid the turbine strings. If the turbine strings are long and would bisect a parcel, they would convert the site into two parcels for farming practices, primarily for moving and manipulating equipment and vehicles to, across, and around the property. The project would require about 62 acres of land to be permanently removed from farm use (see Table 4-2). About 129,000 acres are farmed within Sherman County area, so the amount permanently removed from production would be less than 0.1 percent. Permanent impacts from the Klondike III Wind Project would have a low impact to land use.

Temporary Impacts

Temporary impacts would consist of delays in access to roads or property by construction traffic and temporary displacement of crops by construction activities. Several local roads currently used by farm owners or operators would be improved, which would cause temporary delays, but when completed would improve the functionality of the roads for transporting farm equipment and vehicles. Roadway improvement would be completed on Gosson, Sandon, Smith, and local roads within the analysis area. Construction-related delays could occur on Emigrant Springs, Rayburn, Webfoot, McDonald Ferry, and Dehler roads. The proposed facility would slightly increase traffic volumes from trips by operational staff, but would not cause a reduction in LOS, therefore no effect would occur. About 250 acres of farmland would be temporarily affected by construction, a low impact (DEA 2005) (see Table 4-2).

4.1.5.2 Mitigation Measures

PPM Energy would compensate affected landowners through long-term leases for construction and operation of the wind power facilities.

4.1.6 Biglow Canyon Wind Farm**4.1.6.1 Impacts****Permanent Impacts**

The project would be co-located and compatible with existing and ongoing agricultural activities. The land adjacent to the sites where the turbines, access roads, and construction areas would be located is devoted to the production of wheat and barley crops. Although the presence of the turbine pads and turbines would have an impact on the use of adjacent land, the Biglow Canyon Wind Farm would not seriously interfere with farm practices. The proposed facility would be located on land tracts where its footprint is small in comparison to the total farmed acreage in the tract and thus there is negligible likelihood that the facility would change the pattern of land use by causing certain tracts to go out of farm use. The Biglow Canyon Wind Farm would have a low impact to farm uses. Where necessary, roads would be improved to accommodate construction equipment. Permanent road improvements would benefit the local transportation system.

The project would require that about 157 acres be permanently removed from farm use (CH2MHill, 2005). This would account for less than 0.1 percent of existing acreage in barley and wheat production. The Biglow Canyon Wind Farm would have a low impact to land uses.

Temporary Impacts

Temporary construction-related impacts would be similar to those described for Klondike III, but would affect about 388 acres. Temporary impacts would be low.

4.1.6.2 Mitigation Measures

PGE would compensate affected landowners through long-term leases for construction and operation of the wind power facilities.

4.1.7 Cumulative Impacts

Although potential land use impacts from BPA's Proposed Action and the wind projects would be low, these impacts would contribute incrementally to land use impacts that are already occurring due to present development and activities in the project vicinity, combined with impacts that could occur from the reasonably foreseeable future developments planned in the vicinity. BPA's Proposed Action and the wind projects would contribute to the cumulative conversion of undeveloped land to developed land in the area. Given the relatively small number of current and proposed cumulative projects that are dispersed over a large area, these projects are not expected to result in a significant change in land use in the area.

Most of the land in the project vicinity is zoned for agricultural use. Changes in the types of agricultural use would not create cumulative impacts to land use, but changes from agricultural to nonagricultural uses would take agricultural land out of production. The limited development that is expected in the project vicinity in the near future would not likely create negative cumulative impacts due to the large amount of agricultural land in the area.

Although the current and reasonably foreseeable cumulative wind projects in the project vicinity could convert agricultural land to non-agricultural uses, cumulative land use impacts from these projects would likely be low, because such projects typically do not require a large amount of farm land and allow farming activities to continue. Cumulative impacts would only be expected if nonagricultural development occurred rapidly over the next several years.

4.2 Transportation Facilities

4.2.1 Impact Levels

Impacts would be considered **high** where actions would:

- Preclude future expansion or realignment of the local transportation system.
- Cause permanent traffic increases, or disruption or rerouting of a transportation facility such that major transportation system upgrades would be required.

Impacts would be considered **moderate** where actions would:

- Create long-term disruption of traffic, or increases in traffic such that existing systems would need to be upgraded.

- Create short-term traffic disruptions so that the existing transportation systems could not carry the increased traffic and traffic flow is delayed.

Impacts would be considered **low** where actions would:

- Create short-term traffic disruptions where existing transportation systems could carry the increased traffic temporarily.

No impact would occur if the new facilities would be placed a sufficient distance from the transportation system so that future planned expansion would not be affected, no transportation system upgrades would be required, and any increases in traffic and/or traffic disruptions are short-term and temporary.

4.2.2 BPA Proposed Action

4.2.2.1 Impacts

The BPA Proposed Action would have no long-term impact to the local or regional transportation system. No transmission or substation facilities (including the future substation) would be placed within existing road rights-of-way. Construction equipment and supply vehicles would use the existing state highway system and county roads to reach the construction area. While portions of the transmission line would be next to North Klondike and Herrin roads, the transmission line would be outside of existing road ROW and would not hinder any future expansion of the road. As with the wind projects, some road improvements may be necessary to accommodate construction-related equipment or to repair sections of road damaged by heavy equipment and construction-related traffic. During construction, temporary, short-term disruption to traffic could occur, although the level of the impact is anticipated to be low because of existing low traffic volumes within the analysis area. Disruption of existing traffic patterns would likely be caused by construction traffic entering and leaving county roads to access construction areas.

All project construction would occur on BPA-owned property for the substations or on private property with ROW easements for the proposed transmission line. During operation, the Proposed Action would not increase existing traffic levels because no additional staff is anticipated to be needed to maintain the new transmission line, substations or expansion of the existing John Day Substation.

BPA would use the existing road system as much as possible for construction, although temporary access from the existing road system to the construction site would be needed to construct each structure located within the proposed easement for the transmission lines. Access roads from county roads to construction areas would be about 14 feet wide, would be temporary, and would be removed after construction. If construction were scheduled during the dry season, little or no rock would be necessary for temporary access roads.

Ground disturbed for temporary roads would be restored to its pre-construction condition after the transmission line is built. If crop damage were to occur or farmland

be removed from production during construction or maintenance, landowners would be compensated for lost revenue. Access roads, where needed, would be constructed in locations with the most direct route and shortest distance from the public ROW to the construction site to minimize impacts to farmland. Temporary road construction would be coordinated with landowners, to the extent practical, to minimize impacts on property.

4.2.2.2 Mitigation Measures

When construction of the transmission line and substations is completed, the contractor responsible for construction would remove temporary access roads and staging areas used to access tower construction sites. The contractor would rehabilitate areas temporarily affected by construction to pre-construction conditions.

Roadways used for transporting equipment and materials to the project site would be inspected by Sherman County and BPA prior to beginning construction, to identify any potential safety concerns, such as large potholes or inadequate pavement conditions. During construction, transport routes would be periodically inspected by the County and BPA to determine if construction-related traffic is having an adverse impact on the roadway.

4.2.3 Middle Alternative

4.2.3.1 Impacts

The Middle Alternative would have similar impacts to the state and county road system as the Proposed Action.

4.2.3.2 Mitigation Measures

Mitigation measures would be the same as for the Proposed Action.

4.2.4 BPA No Action Alternative

Under the No Action Alternative, no impacts to the transportation system would occur and road improvements proposed by the wind power projects would not be completed. Roads would remain as they are today.

4.2.5 Klondike III Wind Project

4.2.5.1 Impacts

The proposed Klondike III Wind Project would be constructed on private property and would not interfere with any future improvement to the local transportation system.

Traffic related to the operation of the proposed Klondike III Wind Project would have little impact to the existing or projected LOS on the state highway or local transportation

system. All transportation routes within the County are projected to operate with LOS A or B in 2019 (TSP planning horizon, see Section 3.2, Transportation) even during summer when traffic volumes are highest. Given that 15 to 20 employees would work at the facility, the increase in the number of trips on the road system would be minimal and would not affect the operation of the roadway system (DEA, 2005).

Construction-related traffic is anticipated to take I-84 to US 97 (at Biggs Junction) to the US 97/OR 206, then OR 206 to Wasco. Construction traffic could also approach the site from the south on US 97. Both US 97 and OR 206 are two-lane paved highways with poor to fair pavement condition. From Wasco, construction-related traffic would use a series of county roads to access private land where the construction staging areas and turbine strings would be located. Local roads are generally gravel rural roadways with little traffic other than local residential and farm traffic. Local roads that would be used include: Wasco Lane, North Klondike Road, Emigrant Springs Road, Rayburn Road, Dehler Lane, Dormaier Road, McDonald Ferry Lane, Gosson Lane, Egypt Road, and Smith Road. An unnamed road connecting Gosson Lane and Dormaier Road would also be used.

No physical impact is anticipated to occur on highways (I-84, US 97, and OR 206) because all are constructed to accommodate the heavy loads of trucks (estimated at up to 80,000 lbs) that would deliver the turbine components and other construction materials. Some of the local roadways would require improvements, which would generally be a 6-inch gravel layer placed on top of the existing road prior to project construction to accommodate the length and weight of vehicles that would deliver the turbine pieces and machinery necessary for construction. Large sections of local roads in poor condition would be completely reconstructed. Reconstructed roadways would be improved to accommodate two 8-foot travel lanes and would be constructed with 8 inches of crushed aggregate on top of a geotextile separation fabric (DEA, 2005). All improvements on local roads would be constructed within the public right-of-way. During roadway improvements or reconstruction, some short-term delays would likely occur. The proposed improvements would have a beneficial impact to the Sherman County Road Maintenance Department because it would not have to pay for the improved roads, although long-term maintenance would still be the County's responsibility.

Construction-related traffic could have a low impact by causing short-term traffic delays when trucks deliver construction-related equipment and the turbines, but those delays would be temporary and are not anticipated to have an adverse impact on highways in the analysis area. Construction-related traffic delays on local roadways could occur but are anticipated to be limited due to low use of these local roadways. Several local roadways would be improved or completely reconstructed to accommodate construction-related traffic. Many of the existing local roads are in poor condition; the proposed improvements would have a beneficial long-term impact by improving the quality of the road for all users.

4.2.5.2 Mitigation Measures

When construction of the project facilities is completed, the contractor(s) responsible for construction would remove temporary access roads and staging/laydown areas used to access construction sites. The contractor(s) would rehabilitate areas temporarily affected by construction to pre-construction conditions.

Roadways used for transporting equipment and materials to the project site would be inspected by Sherman County and PPM Energy prior to beginning construction, to identify any potential safety concerns, such as large potholes or inadequate pavement conditions. During construction, transport routes would be periodically inspected by the County and PPM Energy to determine if construction-related traffic is having an adverse impact on the roadways. If inspections indicate damage from construction-related traffic, PPM Energy would be responsible for making the necessary improvements.

4.2.6 Biglow Canyon Wind Farm

4.2.6.1 Impacts

The proposed Biglow Canyon Wind Farm would be constructed on private property and would not interfere with any future improvement to the local transportation system.

As with the proposed Klondike III Wind Project, traffic related to the operation of the proposed Biglow Canyon Wind Farm would have no impact to the existing or projected LOS on the state highway or local transportation system. All transportation routes within the county currently operate at LOS A or B and are projected to maintain that high level of service, even during the summer. Given that only 15 to 20 employees would work at the facility, the increase in the number of trips on the road system would be minimal and would not affect the LOS of the roadway system (CH2MHill, 2005).

The primary route for construction-related traffic would carry the majority of heavy-duty and light-duty delivery vehicles as well as workforce traffic. The route would begin from either eastbound or westbound I-84, and continue south on US 97 (from Biggs Junction) to Wasco. From Wasco, construction-related traffic would travel east and then southeast on OR 206 before heading due east on either Klondike Road or Hilderbrand Lane. Vehicles would then progress north on North Klondike Road to various county roads to access individual turbine string roads. County roads used for construction access would include sections of Medler Lane, Emigrant Springs Road, Oehman Road, Biglow Road, Beacon Road, and Herrin Lane. It is assumed that all improvements on local roads would be constructed within the public right-of-way.

No physical impact is anticipated to occur to the state highway system. As with Klondike III, county and local roadways would likely require some improvement before construction would begin, including regrading and in some cases reconstructing county roadways to accommodate construction and delivery equipment (CH2MHill, 2005). During any roadway improvements or reconstruction, some short-term delays would likely occur. Any road improvements would be a beneficial impact to the County as

improvements would remain in place after construction, though maintenance of the road would still be the County's responsibility.

Construction-related traffic would have a temporary low level of impact to state and county roadways from traffic increases as construction vehicles access the site. Because of the rural nature of the area, roadways currently accommodate very few trips and all routes in the county operate at LOS A. Additional construction traffic would temporarily increase the volume of vehicles on the roadway, but not to the point where traffic flow would be delayed.

4.2.6.2 Mitigation Measures

After construction of the project facilities, the contractor(s) responsible for construction would remove temporary access roads and staging/laydown areas used to access construction sites. The contractor(s) would rehabilitate areas temporarily affected by construction to pre-construction conditions.

Roadways used for transporting equipment and materials to the project site would be inspected by Sherman County and PGE prior to beginning construction, to identify any potential safety concerns, such as large potholes or inadequate pavement conditions. During construction, transport routes would be periodically inspected by the County and PGE to determine if construction-related traffic is having an adverse impact on the roadway. If inspections indicate damage from construction-related traffic, PGE would be responsible for making the necessary improvements.

4.2.7 Cumulative Impacts

Construction, operations and maintenance of the proposed transmission facilities and wind projects and the projects listed in Table 4-1 have had or are expected to have a low impact on regional and local roads. The Biglow Canyon Wind Farm and Klondike Wind Project Phases I, II, and III) would employ 40 to 50 (15 to 20 people each at Biglow Canyon Wind Farm and Klondike III Wind Project, eight to 10 at Klondike I and II), generating about 100 daily trips on local county roads. Other wind projects would also add a small number of trips from employees, but given the small amount of existing and projected traffic in the county, additional trips generated by staff of all proposed projects would not negatively affect the LOS of existing roads in Sherman County.

A short-term cumulative impact could potentially occur if several projects were constructed at the same time. Truck traffic could increase on highways, but capacity along local and state roads would be adequate to accommodate the increased trips, and it is unlikely levels of safety or service on any major highways would be affected. Some short-term traffic delays could occur. No delays are anticipated after construction.

Construction of the proposed Klondike III and Biglow Canyon wind projects would have a cumulative beneficial impact to the local transportation system. Prior to constructing the facilities, several roads would need to be improved to accommodate construction vehicles for both projects. Road improvements would remain in place after wind power facilities are completed that would be used by local residents, and for

moving farm equipment. Improving these roads would be a beneficial impact to Sherman County because the cost of roadway improvements would be paid for by the wind power facilities and improvements would remain in place after construction.

4.3 Recreation

4.3.1 Impact Levels

Impacts would be considered **high** where actions would:

- Preclude existing or planned ***dispersed recreational*** uses after construction;
- Alter or eliminate dedicated recreational activities after construction;
- Permanently negatively affect the recreational experience, of either a dedicated or dispersed recreational use, e.g., if a facility next to a hiking trail changed the rural hiking experience, or lights from wind turbines obliterated the night sky for astronomy clubs.

Impacts would be considered **moderate** where actions would:

- Temporarily preclude or limit dispersed or dedicated recreational uses during peak-use periods during construction;
- Temporarily affect the recreational experience, of either a dedicated or dispersed recreational use during peak-use periods, e.g., if a facility next to a hiking trail changed the rural hiking experience.

Impacts would be considered **low** where actions would:

- Temporarily preclude or limit dispersed or dedicated recreational uses during off-peak use during construction;
- Require minor relocation of dispersed recreational activities to an equal or better location after construction.
- Temporarily affect the recreational experience during off-peak use, of either a dedicated or dispersed recreational use, e.g., if a facility next to a hiking trail changed the rural hiking experience.

No impact would occur to recreation areas if there were no effect on the location or experience of recreational uses during or after construction.

4.3.2 BPA Action Alternatives, Klondike III Wind Project, and Biglow Canyon Wind Farm

4.3.2.1 Impacts

None of the recreational facilities described in Section 3.3 would be removed or relocated and no recreational activities would be precluded as a result of the proposed project. Likewise, there would be no impact to hunting on private land. However, visual impacts to recreational resources could occur, particularly in areas where the landscape is relatively flat and views are unobstructed by trees or natural features. Impacts to visual resources are also addressed in Section 4.8, Visual Resources.

Temporary, construction-related impacts such as short-term traffic delays on US 97 and local roads could affect access to recreational opportunities, although impacts to recreational uses are expected to be low because motorists could use existing passing lanes on US 97 to pass large, slower moving construction-related equipment. Short-term traffic delays would have no impact on the availability of recreation amenities. Local road improvements (see Section 4.2, Transportation Facilities) would enhance portions of the access route to the John Day River via McDonald Ferry Lane, and thus have some positive impact on ability to access the river. Visitor interest in the proposed wind farms could augment visits to existing recreational opportunities.

John Day River

The BLM manages the John Day River Corridor. BPA's action alternatives would be constructed on private land and BPA land (substation) and would not be under BLM jurisdiction. There would be no direct loss of recreational opportunity. Impacts to the John Day River would occur in isolated areas (up to about river mile 17) where turbines would be visible. BLM classifies all wild and scenic river segments as VRM Class II in which "management activities resulting in changes to the existing character of the landscape may be allowed, provided they do not attract the attention of the casual observer." Generally, where views would be altered, it would occur in limited areas and would have little effect on recreation activities. Few turbines or turbine blades would be visible from any single location. To the extent the turbines would be visible, they would be subordinate in view because portions of views of the John Day Canyon are already obstructed by existing transmission lines (DEA, 2006c; CH2MHill, 2005). The slight modification of views from the John Day River corridor would have no impact on the recreational experience in that area.

Above the river, portions of the proposed wind projects would be visible from some locations along the upper portions of the canyon walls. Because recreation access to the rim and canyon walls is very limited, towers would have no impact on the recreational experience.

Journey Through Time Scenic Byway

There would be no direct loss of recreational opportunity as a result of the proposed transmission line and wind projects. Temporary, construction-related impacts could occur to the Byway from increased traffic, but they would be of limited duration.

While portions of the proposed wind projects and transmission line would be visible from the Journey Through Time Scenic Byway, the proposed project would be compatible with the goals stated in the Journey Through Time Management Plans because it would do the following: 1) create jobs, 2) maintain rural lifestyles, 3) protect important values (i.e., historical attractions and artifacts), and 4) build identity for the North Central Region of Oregon (DEA, 2005). There are no scenic overlooks or vista points along the segment of highway near the proposed projects. BPA's action alternatives would have no impact because their effects do not meet the criteria for high, moderate, or low impacts, although turbines and transmission lines would be intermittently visible from the Byway. The action alternatives would not preclude the use of the road as a recreational amenity. The alternatives would also only be visible in limited areas because existing topography would screen much of the proposed project. Views of the turbine strings could have a beneficial recreation impact by attracting motorists to view the area.

Historic Oregon Trail and Barlow Road Cutoff Trail Alignments

The proposed transmission line, substations and wind projects would not be visible from the BLM Oregon Trail Interpretive Site near McDonald Ferry so there would be no visual impact to that recreational site. The project would be visible from many points along the historic Oregon Trail alignment, but not from known, accessible, intact segments.

There would be no direct or indirect loss of a recreational opportunity related to the Oregon Trail as a result of the proposed projects. All development would occur on private property on which no intact trail segments have been identified. Further, the project would not affect existing locations where the historic trail alignments cross county roads, nor would turbines be constructed over the historic alignments. Access roads would cross the historic alignments in a few locations, but would not impact intact segments because none exist at the proposed access road crossings.

4.3.2.2 Mitigation Measures

Because there are no identified recreational resources directly affected, no mitigation measures are proposed. Impacts related to visual resources of the proposed projects are described in Section 4.8.

4.3.3 BPA No Action Alternative

Under the No Action Alternative, no new substation, substation expansion or transmission line would be constructed; therefore, no impacts to recreation would occur.

4.3.4 Cumulative Impacts

Cumulative impacts to recreational resources would be primarily visual impacts and are addressed in Section 4.8.8. None of the cumulative projects are known to be proposed within identified recreational areas or resources in the project vicinity, so direct loss of recreational opportunities is not expected. It is expected that the cumulative effects to the dispersed recreation that occurs in the area such as hunting, fishing, etc., would be low because this type of recreation could continue after development.

4.4 Geology and Soils

4.4.1 Impact Levels

Impacts would be considered **high** where actions would:

- Require road or facility construction or clearing on sites that are prone to mass movement or have very high susceptibility to erosion.
- Occur on soils with soil properties so unfavorable or difficult that standard mitigation measures, including revegetation, would be ineffective.
- Cause long-term impacts from accelerated erosion, sedimentation, or disruption of unstable soils.

Impacts would be considered **moderate** where actions would:

- Create impacts that are primarily short term, with an increase in normal erosion rates for a few years following soil disturbance until erosion and drainage controls become effective.

Impacts would be considered **low** where actions would:

- Require road and facility construction on soils with low to moderate erosion hazard, and where the potential for successful mitigation would be good using standard erosion and runoff control practices.
- Occur where erosion levels could be held near normal during and following construction.

No impact would occur where soils remain unchanged and no erosion occurs.

4.4.2 BPA Action Alternatives

4.4.2.1 Impacts

Soils and geologic conditions are similar for the Proposed Action and Middle Alternative.

Geologic conditions along the proposed routes and at the proposed substation and substation expansion are relatively stable and suitable for the proposed activities. The

alternatives would not affect geologic conditions and would have the same potential for exposure to geological hazards. Exposure would be low to none.

Most of the project site consists of agricultural fields where bare soils are often exposed to wind and water. Based on the soil types present, soil erosion potential ranges from highly erodible to not highly erodible (MacDonald et al., 1999). However, because the project would not appreciably increase the amount of exposed soils, impacts would be low. The land along the proposed routes is primarily plowed cropland, and to a lesser extent, other vegetation.

Permanent impacts would involve the removal of soil from about 16.6 acres of land for the Proposed Action and a similar amount for the Middle Alternative. Because the soil types to be removed are common throughout the analysis area, the removal of this small area of soil would be a low impact for either alternative.

Temporary impacts would include disturbance of about 116 acres of soil for the Proposed Action and about 120 acres of soil for the Middle Alternative. Temporary soil disturbance would occur during construction of the transmission towers, staging area, temporary access roads, and substation construction. Establishing the staging area would involve stripping and temporarily stockpiling the topsoil before placing gravel on the laydown areas. BPA would try to minimize the need for such disturbance by finding areas already graveled or paved if possible. Because stockpiling would occur during the time of year when rainfall is lowest, very little erosion would result from precipitation. After the staging area is no longer needed, the site would be brought back to its original contours, topsoil would be spread on the site, and normal cropping or revegetation would occur.

While the project would use existing roads to the extent practical, temporary access roads would be needed. These roads would be 14 feet wide. Specific locations of temporary access roads have not been determined and would be coordinated with landowners to minimize impacts. As needed, water trucks would be used to keep wind erosion losses to a minimum. Any disturbed CRP and other non-cropped vegetated areas would be **revegetated** with appropriate species. Construction would require the use of heavy equipment and haul trucks to deliver aggregate, water, and other materials. The repeated traffic of heavy machinery could cause localized soil compaction. To minimize compaction, truck traffic would be limited to designated existing and improved road surfaces, whenever feasible. Any compacted soils outside of the permanent project footprint would be restored.

Erosion control **best management practices** (BMPs) would be used to manage wind and water erosion. Areas of temporary disturbance would be revegetated as appropriate. The BPA action alternatives would result in a low impact to soils because erosion control measures are expected to keep erosion levels near normal during and after construction.

Overall temporary impacts to soils would be similar to impacts resulting from existing farm uses (e.g., regular disturbance from crop production). All soils temporarily disturbed by construction would be returned to pre-construction contours and condition. Therefore, temporary impacts to soils are expected to be low.

4.4.2.2 Mitigation Measures

Because impacts would be low and appropriate erosion control measures are included in the Proposed Action, additional mitigation measures are not proposed.

4.4.3 Klondike III and Biglow Canyon Wind Projects

4.4.3.1 Impacts

Geologic and soil conditions are similar to those described for the BPA action alternatives. Permanent impacts would include removing soil from about 219 acres of land (about 62 acres from Klondike III and about 157 acres from Biglow Canyon). The potential for exposure to geological hazards would be low. Topsoil removed for construction of project facilities would likely be applied to surrounding agricultural fields. Because the soil types to be removed are common throughout the project area, the removal of this small area of soil would be a low impact.

Temporary impacts would result from activities such as road construction (with associated underground collector system) and turbine pad construction, which may require the removal of surface vegetation, and expose soils. Turbine pad areas would be covered with non-erosive material, such as gravel or concrete, immediately following exposure, thereby limiting the time for wind or water erosion to soils stockpiled from turbine pad excavation.

Temporary impacts would occur with creation of staging areas and excavation for underground collector cables not associated with roads. Staging areas would be constructed in a similar fashion as for the BPA action alternatives. BMPs would be used to minimize the impacts of wind erosion. In actively cropped areas, the wheat crop would protect the stockpiles from wind erosion. In other areas, hay bales or others similar containment would be provided. As needed, water trucks would be used to keep wind erosion losses to a minimum. After construction, the staging areas would no longer be needed, the sites would be brought back to their original contours, topsoil would be spread on the site, and normal cropping or revegetation would occur. Any disturbed CRP areas and other non-cropped vegetated areas would be revegetated with the appropriate species. In addition to revegetation, BMPs would likely include the use of silt fences, straw bales, watering, check dams, and other similar erosion control methods.

Construction would require the use of heavy equipment and haul trucks to deliver aggregate, cement, water, and other materials. The repeated traffic of heavy machinery could cause localized soil compaction. To minimize compaction, truck traffic would be limited to designated existing and improved road surfaces, whenever feasible. Any compacted soils outside of the permanent project footprint would be restored.

No soil impacts would be expected from chemicals during construction, operation, or retirement. There would be minimal amounts of chemicals used at the facility sites such as lubricating oils and cleaners for the turbines and pesticides for weed control. Chemicals would be stored on site according to all applicable requirements and

regulations to limit the risk of adverse effects. The risk of a chemical spill is negligible, and the impacts of any such spill would be limited due to the small amounts of chemicals that would be transported to the facility sites.

Temporary impacts would disturb about 683 acres (about 295 acres from Klondike III and about 388 acres from Biglow Canyon).

4.4.3.2 Mitigation Measures

Construction of all features of the project would be in compliance with an erosion control plan and National Pollutant Discharge Elimination System (NPDES) 1200-C construction permit that would require BMPs to minimize possible impacts from erosion. Erosion control measures that would be installed during work on the access roads, staging areas, and turbine sites would include the following:

- Not removing vegetation unless absolutely necessary and not removing existing vegetation any sooner than would be absolutely necessary.
- Maintaining vegetative buffer strips between the areas impacted by construction activities and any receiving waters.
- Installing sediment fence/straw bale barriers to filter sediments prior to reaching adjacent resources.
- Surfacing the areas with gravel or other non-erodible surface as quickly as possible.
- Planting designated seed mixes at impacted areas adjacent to the roads.
- Watering roads and exposed soils in dry weather when wind exposure may cause erosion.

All non-agricultural areas that are impacted by the construction would be seeded when there would be adequate soil moisture. Sediment fences, straw bale barriers, and other erosion control measures would remain in place until the impacted areas are revegetated and the risk of erosion has been eliminated.

To the extent possible, haul truck traffic would be limited to improved road surfaces, limiting soil compaction and disturbances. Proper erosion control methods would be employed to limit soil loss due to water and wind action, and all areas of temporary disturbance would be reclaimed at the end of construction activities.

4.4.4 No Action Alternative

Under the No Action Alternative, no new wind power generation or transmission facilities would be built. No new impacts to soil or geologic resources would occur.

4.4.5 Cumulative Impacts

Soil loss through both wind and water erosion has occurred throughout the project vicinity as a result of past and present development. Practices creating soil losses include road construction, and other development, expansion of towns and cities, and the conversion of native lands to crops and grazing lands. The proposed projects would incrementally increase the potential for soil erosion in the analysis area.

Cumulative impacts include the permanent conversion of soils to energy generation, transmission, and substation facilities and appurtenances (e.g., O&M facilities meteorological towers, access roads). Other development could result in additional soil conversion within the region.

4.5 Water Resources

4.5.1 Floodplain Impact Levels

No impacts to floodplains are anticipated, as none are mapped within the project study area.

4.5.2 Groundwater Resources Impact Levels

No impacts to groundwater resources are anticipated. The proposed project would not appreciably affect the ability for precipitation to infiltrate and recharge local and regional aquifers. Runoff from any new impervious surfaces would be shed to adjacent undeveloped pervious areas where it would be allowed to percolate into soils.

4.5.3 Wetlands and Surface Water Resources Impact Levels

Impacts would be considered **high** where actions would:

- Permanently alter wetland hydrology, vegetation, and/or soils by excavation or fill, where the ecological integrity of a wetland was impaired; or
- Completely fill a wetland or destroy a wetland function.

Impacts would be considered **moderate** where actions would:

- Partially fill a wetland or degrade a wetland function to the point where recovery would require restoration and monitoring.

Impacts would be considered **low** where actions would:

- Change vegetation or soils for the short term but would not change hydrology; or
- Cause a short-term disruption of a wetland function.

No impact would occur if the action avoids wetlands and their buffers and would not affect wetland functions.

4.5.4 BPA Proposed Action

4.5.4.1 Impacts

The BPA Proposed Action is located far from any of the wetlands identified in the analysis area; therefore no impacts to wetlands would occur. The three jurisdictional drainages (Drainages A, B and C) crossed by the Proposed Action would be spanned, and no access roads would be constructed across them (see Table 4-3). No impacts to surface waters would result from the project.

Table 4-3 Summary of Impacts to Wetlands and Surface Waters

Water Resource	Project Area	Proposed Action	Impact Level
Wetland W1	Biglow Canyon	Avoided	None
Wetland W2	Klondike III	Avoided	None
Drainage A	BPA Proposed Action	Spanned, no access roads	None
Drainage B	BPA Proposed Action	Spanned, no access roads	Low
Drainage C	BPA Proposed Action	Spanned, no access roads	Low
Drainage D	Middle Alternative	Spanned, no access roads	None
Drainage E	Middle Alternative	Spanned, no access roads	None
Drainage F	Middle Alternative	Spanned, no access roads	None

4.5.4.2 Mitigation Measures

Since no impacts to wetlands or surface waters would result from construction of the BPA Proposed Action, no mitigation would be necessary to compensate for project activities.

4.5.5 Middle Alternative

4.5.5.1 Impacts

The Middle Alternative is located far from any of the wetlands identified in the analysis area, therefore no impacts to wetlands would occur. The three jurisdictional drainages (Drainage D, E, and F) crossed by the Middle Alternative would be spanned, and no access roads would be constructed across them (see Table 4-3). No impacts to surface waters would result from the project.

4.5.5.2 Mitigation Measures

Since no impacts to wetlands or surface waters would result from construction of the Middle Alternative, no mitigation would be necessary to compensate for project activities.

4.5.6 Klondike III Wind Project

4.5.6.1 Impacts

No impacts to wetlands or other waters of the state and US are anticipated as a result of this proposed project (DEA, 2005). The one wetland identified within the site boundary (W2) would be avoided through appropriate siting and construction techniques. No impacts to wetlands or surface waters are expected.

4.5.6.2 Mitigation

Since no impacts to wetlands or surface waters would result from construction of the Klondike III Wind Project, no mitigation would be necessary to compensate for project activities.

4.5.7 Biglow Canyon Wind Farm

4.5.7.1 Impacts

Only one wetland was identified in the Biglow Canyon analysis area (W1) and it would not be affected because the collector system would be located to avoid any impacts to that resource (i.e., no impact). Impacts to wetlands and surface water would be limited to minor disturbance of non-jurisdictional drainages, a low impact.

4.5.7.2 Mitigation Measures

Since no impacts to wetlands or surface waters would result from construction of the Biglow Canyon Wind Farm, no mitigation would be necessary to compensate for project activities.

4.5.8 No Action Alternative

No new impacts to wetlands or surface waters would occur under the No Action Alternative.

4.5.9 Cumulative Impacts

Wetland and water resources have been impacted in the region because of past and current development and agricultural operations. Future development activities could

result in the further degradation and reduction of wetlands and water resources in the region.

Most of the project wetland analysis area has been previously disturbed by human activities. No impacts to jurisdictional wetlands or waters are anticipated from the BPA transmission line and substation, Klondike III Wind Project or the Biglow Canyon Wind Farm, and the proposed actions would not contribute to cumulative impacts to water resources.

4.6 Fish and Wildlife

The analysis area contains no habitat for fish species. Only intermittent streams are present in the analysis area (see Section 3.6.2.6). Fish and fish habitat are not discussed further in this section.

4.6.1 Wildlife Impact Levels

Impacts would be considered **high** where actions would:

- Create a short- or long-term adverse effect on a species **federally listed** as threatened or endangered that could not be mitigated; or
- Create a short or long-term adverse effect on a state-listed species, other rare or declining species or species with high public profiles, values or appeal that could not be mitigated; or
- Create a long-term reduction in the quality or quantity or regional wildlife habitats.

Impacts would be considered **moderate** where actions would:

- Create a short or long-term adverse effect on a species federally listed as threatened or endangered that could be partially mitigated; or
- Create a long-term adverse effect on a state-listed species, other rare or declining species or species with high public profiles, values or appeal that could be partially mitigated; or
- Cause a short-term reduction in the quality or quantity of regional wildlife habitats; or
- Harm or kill individuals of a wildlife species, but not contribute to a reduction in the viability of regional populations.
- Temporarily disturb common wildlife species during critical life stages (e.g., breeding, rearing or roosting).

Impacts would be considered **low** where actions would:

- Create a short- or long-term adverse effect on a species federally listed as threatened or endangered that could be fully mitigated; or

- Create a short- or long-term adverse effect on a state-listed species, other rare or declining species or species with high public profiles, values or appeal that could be fully mitigated; or
- Cause a temporary reduction in the quality or quantity of regional wildlife habitats; or
- Harm or kill isolated individuals of a wildlife species, which would not contribute to a reduction in the viability of local populations.
- Temporarily disturb common wildlife species during non-critical life stages.

No impact would occur when an action would have no effect on wildlife habitat, populations, or individuals.

4.6.2 BPA Proposed Action

4.6.2.1 Impacts

Undeveloped habitats in the analysis area would be spanned by structures or avoided by alignment placement, and no direct impacts to species listed as threatened or endangered under the ESA or by the State of Oregon are anticipated. Bald eagles and peregrine falcons may be present near the analysis area, especially at the northern end near the Columbia River. However, modern transmission line structures are common in bald eagle and peregrine falcon habitat and are only rarely, if at all, implicated in causes of mortality for these species. Therefore, no impact to bald eagles and peregrine falcons from the construction and operation of the transmission line is expected. Impacts to other state-listed sensitive species range from no impact to moderate impacts (see Table 4-4).

One small area of upland tree habitat east of Scott Canyon Road was found to contain a Swainson's hawk nest along an existing public road south of the proposed transmission line route for the Proposed Action (WEST, 2005a). The nest site could be temporarily and indirectly affected by construction activities, but impacts from operations (potential for collision, noise, etc.) would be low considering the size and extent of the lines. Since seasonal restrictions would be implemented if the nest was found to be active, impact levels would be low, since critical life stages would not be impacted. No other raptor nests are present within 0.25 mile of the proposed transmission line.

Impacts from the transmission line to other sensitive bird species would range from none to low. In some instances, such as during very foggy weather, some bird species may strike the overhead ground wire or a conductor and be harmed or killed. Other species, especially songbirds, could be hit by construction vehicles or the small number of additional vehicles associated with maintenance activities as they fly across roads. Both of these events are expected to be rare and only involve individual birds. Impacts from these types of events would not reduce the viability of local populations of any of these species and would be considered a low impact.

Table 4-4 Impact to Federal and State Listed Threatened, Endangered and Sensitive Species

Species Common Name (Species Scientific Name)	Federal Status	State Status	Impact Level				
			BPA Proposed Action	BPA Middle Alternative	No Action Alternative	Klondike III Wind Project	Biglow Canyon Wind Project
Birds							
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	T/EA	T	None	None	None	Low	Low
Peregrine Falcon (<i>Falco peregrinus anatum</i>)	--	E	None	None	None	Low	Low
Golden eagle (<i>Aquila chrysaetos</i>)	EA	--	None	None	None	Low	Low
Swainson's hawk (<i>Buteo swainsoni</i>)	--	SV	Low	Low	None	Moderate	Moderate
Rough-legged hawk (<i>Buteo lagopus</i>)	--	--	Low	Low	None	Moderate	Moderate
Red-tailed hawk (<i>Buteo jamaicensis</i>)	--	--	Low	Low	None	Moderate	Moderate
Ferruginous hawk (<i>Buteo regalis</i>)	SoC	SC	Low	Low	None	Moderate	Moderate
Long-billed curlew (<i>Numenius americanus</i>)	--	SV	Low	Low	None	Low	Low
Bank swallow (<i>Riparia riparia</i>)	--	SU	Low	Low	None	Low	Low
Columbian sharp-tailed grouse (<i>Tympanuchus phasianellus columbianus</i>)	SoC	--	None	None	None	None	None
Western greater sage grouse (<i>Centrocercus urophasianus</i>)	SoC	SV	None	None	None	None	None
Common nighthawk (<i>Chordeiles minor</i>)	--	SC	Low	Low	None	Low	Low
Eastern Oregon willow flycatcher (<i>Empidonax traillii adastus</i>)	SoC	SU	None	None	None	None	Low
Western burrowing owl (<i>Athene cunicularia hypugaea</i>)	SoC	SC	Low	Low	None	Low	Low
Grasshopper sparrow (<i>Ammodramus savannarum</i>)	--	SV/SP	Low	Low	None	Moderate	Moderate
Lewis' woodpecker (<i>Melanerpes lewis</i>)	SoC	SC	None	None	None	None	None
Western bluebird (<i>Sialia mexicana</i>)	--	SV	Low	Low	None	Low	Low
Western meadowlark (<i>Sturnella neglecta</i>)	--	SC	Low	Low	None	Moderate	Moderate
Yellow-breasted chat (<i>Icteria virens</i>)	SoC	Soc	Low	Low	None	Low	Low
Loggerhead shrike (<i>Lanius ludovicianus</i>)	--	SV	Low	Low	None	Low	Low

Species Common Name (Species Scientific Name)	Federal Status	State Status	Impact Level				
			BPA Proposed Action	BPA Middle Alternative	No Action Alternative	Klondike III Wind Project	Biglow Canyon Wind Project
Mammals							
California bighorn sheep (<i>Ovis canadensis californiana</i>)	SoC	--	None	None	None	None	None
White-tailed jackrabbit (<i>Lepus townsendii</i>)	--	SU	Moderate	Moderate	None	Moderate	Moderate
Hoary bat (<i>Lasiurus cinereus</i>)	--	--	None	None	None	Moderate	Moderate
Long-eared myotis (<i>Myotis evotis</i>)	SoC	SU	None	None	None	Low	Low
Long-legged myotis (<i>Myotis volans</i>)	SoC	SU	None	None	None	Low	Low
Pale western big-eared bat (<i>Corynorhinus townsendii pallascens</i>)	SoC	SC	None	None	None	Low	Low
Pallid bat (<i>Antrozous pallidus pallidus</i>)	--	SV	None	None	None	Low	Low
Silver-haired bat (<i>Lasionycteris noctivagans</i>)	SoC	SU	None	None	None	Moderate	Moderate
Western small-footed myotis (<i>Myotis ciliolabrum</i>)	SoC	SU	None	None	None	Low	Low
Yuma myotis (<i>Myotis yumanensis</i>)	SoC	--	None	None	None	Low	Low
Amphibians							
Northern leopard frog (<i>Rana pretiosa</i>)	--	SC	None	None	None	None	Low
Western Toad (<i>Bufo boreas</i>)	--	SV	None	None	None	None	Low
Painted turtle (<i>Chrysemys picta</i>)	--	SC	None	None	None	None	None
Western rattlesnake (<i>Crotalus viridis oregonus</i>)	--	SV	Low	Low	None	Low	Low
EA – Bald and Golden Eagle Protection Act; E – Endangered; T – Threatened; SoC – Species of Concern; SC – State Sensitive-Critical; SV – State Sensitive-Vulnerable; SU – State Sensitive-Undetermined Status.							

Sensitive mammal species would not be affected by the construction or operation of the transmission line with the possible exception of the white-tailed jackrabbit. This species could be temporarily affected during the breeding season by construction activities, a moderate impact. Bat species would not be affected, as they can echolocate transmission line conductors, ground wires and towers, and are not susceptible to collisions with them.

Bird fatalities could result from impacts with overhead ground wires during foggy conditions, and from increased road traffic along access roads. There could also be temporary disturbance of common nesting birds such as horned lark and meadowlark, denning coyotes, rabbits, or resting sites of ungulates from equipment traveling along access roads (low to moderate impact). Other construction activities such as boring, trenching, and excavation could temporarily disturb these and other common species, such as reptiles. Temporary disturbance to these species during critical life stages is considered a moderate impact for common species and a low impact at all other times. The proposed transmission lines could increase the amount of perching opportunities for some raptor species (e.g., red-tailed hawk, Swainson's hawk, and kestrel). Additional perching opportunities could mean that these species spend more time foraging for small mammals and reptiles in the area surrounding the transmission line. This could lead to some very minor increases in the predation rate of small mammal and reptile populations; however this increased predation is not expected to cause any reduction in the viability of those populations (low impact).

While some raptor species may be attracted to the perching opportunities created by the proposed transmission lines, the potential for bald eagles to be attracted to the new transmission lines is considered to be small. There is no habitat within the project area that would support eagle use, and no large sources of carrion (e.g., sheep or cattle pastures) that would attract bald eagles. With the exception of the area around the John Day Substation (where there are already multiple transmission structures), the new transmission lines would be located away from open water with limited or no line-of-sight to open water. Bald eagle use of the project area would likely be limited to eagles traveling between the Columbia River and the John Day River, and these eagles would generally be flying at altitudes well above the turbines. Bald eagles thus would not be expected to suffer greater exposure to turbine collisions from the perching opportunities created by the proposed transmission lines.

4.6.2.2 Mitigation Measures

According to Oregon Department of Fish and Wildlife (ODFW) standards, the upland tree habitat is considered irreplaceable, since it supports a species (Swainson's hawk) that ODFW considers a State Sensitive species. If the Swainson's hawk nests in this area in subsequent years, construction activities would be coordinated with ODFW and limited during the Seasonality and Sensitive Period for the species, which is June 1 through August 31 (ODFW, 1994). With this coordination and mitigation, there would be no impact to Swainson's hawks from the BPA Proposed Action.

The following mitigation actions would apply to all project activities and would benefit all habitat types and wildlife species in the project vicinity:

- Sensitive areas would include all undeveloped habitats within the project corridor, since these may provide nesting or denning areas for special status/sensitive wildlife. These areas would be flagged in the field prior to construction and the construction contractors would be directed to avoid them during construction.
- Road construction and vehicle use would be minimized where possible to minimize impacts to agricultural habitats. For instance, if construction occurs during summer, access to tower locations would not have to be graveled.
- For habitat restoration and revegetation, seed mixes would be developed in consultation with ODFW. Restoration efforts would be discussed with the landowner to take into consideration existing land use activities and their potential impacts to the vegetation restoration efforts.
- Measures to reduce the potential spread of noxious weeds would be developed in consultation with the Sherman County Soil and Water Conservation District. The facility would be monitored regularly to prevent the spread of noxious weeds.
- Best management practices and erosion and sediment control measures would be employed during project construction to avoid and/or minimize impacts to downslope areas. Areas of unavoidable soil disturbance would be stabilized downslope with straw wattles and bio-filter bags.

4.6.3 Middle Alternative

4.6.3.1 Impacts

Impacts would be similar to those described for the Proposed Action, except that the Swainson's hawk nest near Scott Canyon Road would not be disturbed by this alternative.

4.6.3.2 Mitigation Measures

Mitigation would be the same as those described for the Proposed Action.

4.6.4 Klondike III Wind Project

4.6.4.1 Impacts

Impacts to federal and state listed and sensitive species are shown in Table 4-4.

No impacts to bald eagles or bald eagle habitat are anticipated from the Klondike III Wind Project due to the lack of suitable bald eagle habitat near the proposed project and the generally low levels of observed raptor mortality at recent wind power projects. For

similar reasons an extremely low risk of mortality is anticipated for species only infrequently observed within the site boundaries, such as the peregrine falcon.

A Swainson's hawk nest was identified less than 100 feet north of Dehler Road. The nest lies within a small locust tree in a weedy area used to store farm equipment and tractors. The upland tree habitat is considered irreplaceable by ODFW since it supports a State-listed Sensitive Species. If the Swainson's hawk nests in this area in subsequent years, construction activities would be coordinated with ODFW and limited during the Seasonality and Sensitive Period for the species, which is June 1 through August 31 (ODFW, 1994). An active Swainson's hawk nest was seen in a locust tree near an abandoned house south of Gosson Lane. It lies about 200 feet outside the analysis area. The female was seen sitting on the nest and the male was displaying territorial behavior during site visits (DEA 2005). Since the nest is outside the analysis area, seasonal restrictions would not be necessary.

No other raptor sightings (such as red-tailed hawks or northern harrier) in the analysis area were associated with known nests; they were incidental sightings within the raptors' larger home range. Raptor mortality estimates from the Stateline Wind Project and the Nine Canyon Wind Project have ranged from 0.05 to 0.07 raptor fatalities per turbine per year, with most fatalities consisting of red-tailed hawks and American kestrels (Erickson et al., 2004). Raptor mortality for Klondike III is expected to be similar (8 to 12 per year).

A breeding loggerhead shrike was found in an area within a small island of small locust trees surrounded by agricultural land. The Seasonality and Sensitive Period for the species is April 15 through September 1. ODFW would be consulted on this species and construction activities may be limited during this time period. Impacts would be low.

Average fatality estimates for all birds from regional wind facilities have ranged from 0.9 to 2.9 birds per MW per year. Overall bird use and species richness estimated for the facility was low relative to other wind facility sites in the United States, including other open habitat sites, because most available habitat is cultivated. Overall bird fatality is anticipated to be between 1 and 2.75 fatalities per MW per year (for a total between 275 and 756), a moderate impact. The most common bird fatality probably would be horned larks, a common grassland species. This would be considered a moderate impact since it would create a long-term adverse affect on a common species, but not a high impact, since few rare or special status birds are anticipated to be affected.

A single white-tailed jackrabbit was found outside the analysis area just north of McDonald Ferry Lane, at the easternmost edge of the Klondike III Wind Project in CRP habitat. No ground-disturbing activities are proposed outside the road prism adjacent to the sighting. Therefore, no impact would result and no seasonal restrictions or coordination with ODFW is recommended.

Big game species such as deer would likely be temporarily displaced during active construction (a low impact). Slightly increased human presence during operation of the facility may cause slightly more periodic disturbance than currently exists, however the presence of the turbines is not expected to cause long-term impacts as big game species typically adapt to the presence of large stationary or semi-stationary objects.

Most bat species roost in structures such as buildings, caves, mines and bridges, which are rare to absent within the analysis area; therefore, the construction or retirement of the facility is not anticipated to result in the loss or degradation of bat roosting and foraging habitat in the analysis area. The potential impact to bats could be from collision mortality during operation. Available evidence indicates that this is confined primarily to the migratory species, especially for open agriculture and grassland projects in the West. Migratory bat mortality would likely be in the range of 1.5 to 2.5 bats per MW per year for migratory bat species (for a total of 410 to 683 bats), a moderate impact and lower for resident bat species (low impact).

Other common wildlife species could be temporarily disturbed or displaced during critical nesting or denning periods, which would be a moderate impact. No specific mitigation measures are proposed for these species, as they are relatively common and the project would not have an effect on the health of their populations.

Overall, impacts to wildlife species from the proposed project range from low to moderate.

4.6.4.2 Mitigation Measures

The project would have no impacts on federally-listed species; therefore no mitigation for listed species is necessary.

The mitigation measures that would be implemented for Klondike III would be similar to those described for the BPA action alternatives. They would apply to all project activities and are anticipated to benefit all habitat types/categories and wildlife species. In addition, a wildlife monitoring and mitigation plan that is standardized with methods used in monitoring programs at regional and national wind power facilities has been developed and will be implemented (see Appendix F). The monitoring program will include bird and bat fatality monitoring, raptor nesting surveys, avian use surveys and reporting. Depending on the outcome of the monitoring program, different levels and types of mitigation would be proposed if fatalities exceed the pre-established thresholds defined in Appendix F. The amount and type of mitigation would be appropriate to the observed impacts and would be conducted in coordination with the Oregon Department of Fish and Wildlife and EFSC. Mitigation would be either grassland/shrubland habitat restoration or conservation for bird species, and either habitat improvement projects or payment to conservation organizations for bat species.

4.6.5 Biglow Canyon Wind Farm

4.6.5.1 Impacts

Impacts to wildlife species for the Biglow Canyon Wind Farm would be similar to those described for the Klondike III project.

Because of the low probability of use by bald eagles and peregrine falcons in the analysis area and the mitigation measures described below, it is not expected that the facility would have any impact on federal or state-listed bird species.

During diurnal walking surveys for sensitive status species, the following species were observed: grasshopper sparrows, short-eared owls, Swainson's hawk, white-tailed jackrabbits, and ferruginous hawk. During nocturnal surveys, white-tailed jackrabbits and western toads were observed (WEST, 2005b).

Two active raptor nests were seen within 1,000 feet of proposed turbine corridors: one Swainson's hawk and one red-tailed hawk. Two additional Swainson's hawk nests were located 1,794 feet and 1,968 feet from a proposed turbine corridor centerline. One additional red-tailed hawk nest was documented in riparian trees 1,220 feet from a proposed turbine corridor centerline. The only other nest in upland trees is an inactive nest of unknown species 1,591 feet from a turbine corridor centerline.

Average fatality estimates for all birds from regional wind facilities have ranged from 0.9 to 2.9 birds per MW per year. Overall bird use and species richness estimated for the facility was low relative to other wind facility sites in the United States, including other open habitat sites, because most available habitat is cultivated. Overall bird fatality is anticipated to be between 1 and 2.75 fatalities per MW per year (for a total between 450 and 1,238), a moderate impact. The most common bird fatality probably would be horned larks, a common grassland species. This would be considered a moderate impact since it would create a long-term adverse affect on a common species, but not a high impact, since few rare or special status birds are anticipated to be affected.

Waterfowl mortality is expected to be low, based on monitoring results of existing facilities in the region, the lack of open water habitat, and the relatively infrequent use of the facility by Canada geese.

Displacement impacts to birds in grassland and shrub-steppe habitats are anticipated to be minimal with reduced densities occurring within less than 328 feet of facilities located in these habitats. Less than 1 percent of the area within 492 feet of the facility is either native grassland or shrub-steppe habitats. This would be a low impact.

Results of fatality monitoring for existing Columbia Basin wind facilities indicate a mortality range from 1.0 to 2.5 bats per MW per year. Based on this range and on similar characteristics of the facility area to those other facilities, bat mortality would also be similar (for a total of 450 to 1,125 bats per year) and primarily involve migratory silver-haired and hoary bats. This would be a moderate impact.

Little risk is expected to non-migratory bat populations in the facility area, given the lack of habitat and fatality results of other facilities in similar habitats, and no impacts to threatened or endangered bat species are anticipated.

Big game species such as deer would likely be temporarily displaced during active construction (a low impact). Slightly increased human presence during operation of the facility may cause slightly more periodic disturbance than currently exists, however the presence of the turbines is not expected to cause long-term impacts as big game species typically adapt to the presence of large stationary or semi-stationary objects.

Road and facility construction would result in a slight loss of foraging and breeding habitat for small mammals. Ground-dwelling mammals would lose the use of the permanently affected areas; however, they are expected to repopulate the temporarily

affected areas. Some small mammal fatalities can be expected from vehicle activity during operations, but impact levels are expected to be low. No evidence exists that supports the presence of Washington ground squirrels in Sherman County.

No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low.

The most probable impact to birds resulting from the operation of the facility is direct mortality or injury caused by collisions with the turbines. Collisions could occur with resident birds foraging and flying within the facility area, or with birds migrating through the facility area. Other impacts could include abandonment of the area because of disturbance caused by facility activities, and mortality or injury caused by collisions with vehicles or other equipment. Both types of impacts would be considered low to moderate as they would likely be isolated occurrences involving individual birds as opposed to large flocks of birds.

4.6.5.2 Mitigation

The Biglow Canyon Wind Farm is not expected to affect listed species; therefore, no mitigation for listed species impacts is required.

The following mitigation measures would be implemented to minimize potential adverse impacts to birds and sensitive habitat.

- Permanent meteorological towers either would not have guy wires, to reduce the potential for collision of birds with guy wires, or if guy wires are used they would be equipped with the type of bird deflectors approved by the ODFW.
- PGE would survey the status of known Swainson's hawk or other raptor nests in the vicinity of proposed construction activities (i.e., within 0.5 mile) before construction activities begin. If an active nest is found, and construction activities are scheduled to occur during the sensitive nesting and breeding season (i.e., mid-April to mid-August), PGE would not engage in construction activities within a 0.25-mile buffer around the nest until the nest fledges young or the nest fails (e.g., is abandoned), unless ODFW approves an alternative plan. If ground-disturbing construction activities continue into the sensitive nesting and breeding season for the following year, PGE would not engage in ground-disturbing construction activities within the 0.25-mile buffer, if the nest site is found to be active, until the nest fledges young or the nests fails (e.g., is abandoned), unless ODFW approves an alternative plan.
- Similar to Klondike III, a wildlife monitoring and mitigation plan that is standardized with methods used in monitoring programs at regional and national wind power facilities has been developed and will be implemented (see Appendix H). The monitoring program would include bird and bat fatality monitoring, raptor nesting surveys, avian use surveys and reporting. Depending on the outcome of the monitoring program, different levels and types of mitigation would be proposed if fatalities exceed the pre-established thresholds defined in

Appendix H. The amount and type of mitigation would be appropriate to the observed impacts and would be conducted in coordination with ODFW and EFSC. Mitigation would be either grassland/shrubland habitat restoration or conservation for bird species, and either habitat improvement projects or payment to conservation organizations for bat species.

4.6.6 No Action Alternative

No new impacts to fish and wildlife habitats would occur under the No Action Alternative.

4.6.7 Cumulative Impacts

Potential cumulative impacts to fish and other aquatic resources from past, present, and future development in the region include the loss of riparian habitat, increased sediment loading, increased stream temperatures, pollution from herbicide and insecticide use, changes in peak and low stream flows, fragmentation of fish habitat, decreases in streambank stability, and altered nutrient supply. No impacts to fish species are anticipated from the BPA transmission line and substation, Klondike III Wind Project, or the Biglow Canyon Wind Farm, and the proposed projects would not contribute to cumulative impacts to fish species.

Conversion to agriculture (e.g., cottonwood farming and crop changes or rotation), habitat fragmentation, livestock grazing, urbanization, and the fire cycle have been identified as large scale wildlife management issues in the shrubland and grassland habitats of eastern Oregon and Washington (Johnson and O'Neil, 2001). The construction of multiple wind power and transmission facilities as well as other development in the project vicinity could cause cumulative impacts to some wildlife species. Cumulative impacts from the operation of the wind power and transmission line facilities on bird and bat species is more likely than impacts to terrestrial species, because these facilities have potential to harm or kill animals that strike them. A study of the potential cumulative impacts to bird and bat species was conducted in 2006 for the Klondike I and II, Klondike III, Biglow Canyon and Orion South projects (West, 2006). This study is included as Appendix A to this EIS. An additional regional analysis of possible cumulative impacts to birds was also completed using the cumulative wind projects identified in Table 4-1. The following summarizes the results of these two cumulative analyses.

Non-Avian Species

The current and proposed wind projects near the analysis area would have no to low impacts to non-avian terrestrial species because almost the entire area is under wheat cultivation and disturbance to these species occurs regularly. The reduction in habitat for terrestrial species from construction of the facilities is not expected to result in any changes in regional populations. The addition of transmission structures would likely increase perching opportunities for some raptor populations. This could have an indirect

effect on small mammal and reptile populations in the areas around the structures due to predation. However, the amount of additional predation is not expected to affect population dynamics of any of these species.

Raptors

Red-tailed hawk, American kestrel, and northern harrier account for most of the raptor use in spring, summer and fall in the analysis areas. In the winter, rough-legged hawk and red-tailed hawk account for most of the raptor use. These species are expected to be the raptor species with the highest risk of mortality across the projects. The potential exists for other raptor species to collide with turbines, including Swainson's hawk, ferruginous hawk, turkey vulture, golden eagle, Cooper's hawk, sharp-shinned hawk, and prairie falcon. However, the mortality risk associated with these species is expected to be much lower than the risk for red-tailed hawks and American kestrel due to the lower use estimates and exposure indices for these species. Common owl species such as great-horned owls, which are typically not effectively surveyed during the day, may also be at risk of collision. Some raptors such as turkey vultures appear less susceptible to collision than most other raptors (Orloff and Flannery 1992, Erickson et al. 2001). In addition, there have been very few northern harrier, ferruginous hawk, and rough-legged hawk fatalities recorded at wind plants, based on recent published data (Erickson et al. 2002). Golden eagle use of the sites is low relative to other wind sites (e.g., Foote Creek Rim, Young et al. 2003) and mortality for golden eagles is also expected to be very low.

Raptor mortality is expected to be similar to other new generation wind projects with similar turbine types located in the Oregon-Washington region. At these other projects, raptor use estimates ranged from about 0.2 to 0.6 per 20-minute survey compared to an average estimate of 0.3 raptors/20-minute survey for Sherman County (West, 2006).

Potential raptor mortality within the combined analysis area would be about 0.024 raptors per turbine per year or one raptor for every 40 turbines per year. Using this raptor mortality rate, the total annual raptor mortality estimate would be about 11 raptor fatalities per year for the three projects combined if all 440 of the proposed turbines are constructed (or one raptor for every 63 MW of generating capacity). This fatality estimate may vary from the expected range based on many factors, including the number of occupied raptor nests near the wind projects after construction, turbine size and other site specific and/or weather variables.

The potential raptor mortality from all of the regional wind projects identified in Table 4-1 would be about 50 raptors per year.

Passerines

Passerines have been the most abundant avian fatality at other wind projects studied (Johnson et al. 2002, Young et al. 2003, Erickson et al. 2000, 2001, 2002), often comprising more than 80 percent of the avian fatalities. Both migrant and resident

passerine fatalities have been observed. Given that passerines make up the vast majority of the avian observations at the sites, it is expected passerines would make up the largest proportion of fatalities for all projects combined. Passerine species most common to the project sites would likely be most at risk, including horned lark and western meadowlark.

Mortality rates at other regional wind projects for all birds combined have ranged from about 0.63 birds per turbine per year to 2.56 birds per turbine per year (or 0.42 to 1.71 birds per MW per year assuming 1.5 MW turbines). Based on the mortality estimates from the other wind plants studied, it is expected that all passerine bird mortality would fall within the mid range or about 1 to 2 birds per turbine per year. Under the assumption that 440 turbines are constructed for all three projects, the total range of passerine mortality would be 440 to 880 fatalities per year, or 0.63 to 1.28 bird fatalities per MW per year. Because horned lark made up slightly more than 50 percent of the bird use during the studies, it is expected that about 50 percent of the fatalities would be of this species. This trend has been shown at the other regional projects in agriculture settings. Using this assumption, about 200-400 horned lark fatalities would occur if all the wind turbines were constructed. The level of estimated mortality is not expected to have any local population level consequences for individual species, due to the expected low fatality rates for most species and the high population sizes of the common species such as horned lark, western meadowlark, and European starling.

As additional wind facilities are developed in the region, more birds would be killed. To further understand the relative level of potential impacts to passerine bird populations from the construction of these wind projects, estimates were made of how many birds could be killed and how much of the current regional bird population would be affected if all of the reasonably foreseeable wind projects (see Table 4-1) in the region are constructed.

To determine regional population effects an area of similar terrain and topography in the eastern portion of the Columbia Basin was selected that included the wind projects listed in Table 4-1. This area lies between The Dalles to the west and Boardman to the east, and within an area about 22 miles wide on either side of the Columbia River (north to south direction). This area totals about 2,600 square miles of mostly agricultural and shrub-steppe areas and is similar in topography, habitat and bird use to the Klondike-Biglow area covered by the local cumulative impacts study, and to other areas from which regional avian mortality data exists. There is a biological justification for assuming, and no apparent reason not to assume, that impacts within the 2,600 square mile region will be similar to and fall within the range of reported impacts at existing projects within this region. Within the 2,600 square mile region it is appropriate, at the level of considering cumulative impacts, to take existing mortality data expressed as per turbine/per megawatt figures, and to extrapolate by multiplying these figures by the total numbers of turbines or megawatts making up all "reasonably foreseeable" projects.

The reasonably foreseeable wind projects total about 3,134 MW of generating capacity. Using the mortality rates observed at some of these facilities (see above), the total passerine mortality if all of these projects are constructed could range from about 1,980 to 4,000 birds per year.

Data on bird density in shrub-steppe habitat was then collected. Two studies that looked at passerine bird density were identified (Smith, et al. 1984, Schroeder 2001). The average passerine density identified was about 392 birds per square mile which, when multiplied by the regional area, results in a total population of about 1,033,000 birds. Both studies looked at relatively undisturbed shrub-steppe habitat, so they probably represent an overestimation of the actual bird density in the region, which is mostly in agricultural lands and tends to have a lower bird species density than undisturbed shrub-steppe habitat.

From these passerine bird mortality, density and population estimates, the impact to the total passerine bird population of the region from the proposed wind projects (if they are all constructed) is conservatively estimated to range from about 0.19 percent to 0.39 percent each year, and is likely much lower. Some species may have proportionately higher impacts based on abundance and habitat requirements (see previous discussion about horned larks), but given the overall relatively low observed impacts from similar wind projects, the cumulative impacts to all bird species is expected to be moderate, and mortality rates are not expected to reduce the viability of any bird species populations in the region.

ESA-Listed Species

The only ESA-listed bird species present in the analysis area and surrounding areas is the bald eagle. This species tends to congregate near open water or forested areas. Current and proposed wind farms are generally located well away from these areas, thus any impacts to this species from turbine or transmission line impacts would be isolated and rare.

Bats

Bat foraging areas such as riparian zones, shrublands, streams, and other water sources are limited in the project area. Wind projects, especially those in open habitats, pose little risk to non-migratory bat populations. Based on the available monitoring information and characteristics of the sites, bat mortality at the projects proposed for northern Sherman County is not expected to vary significantly from other regional wind projects. The results of fatality monitoring for regional wind projects indicate mortality ranges from less than 1 to slightly over 3.0 bats per turbine per year or about 1 to 2.5 bats per MW per year (West, 2006).

Results of the Klondike I monitoring suggest that impacts in Sherman County may be on the lower end of this range. A conservative estimate of bat mortality would fall within the mid range or about 1.5 to 2.5 bats per turbine (or per MW) per year. Provided that 440 turbines are constructed for all three projects, the total range of bat mortality would be from 660 to 1,100 fatalities per year. Actual levels of mortality are unknown and could be lower or higher, depending on factors such as regional migratory patterns of bats, patterns of local movements through the area, and the response of bats to turbines, individually and collectively. Mortality would involve primarily silver-haired and

hoary bats, and no impacts to threatened or endangered bat species are anticipated. The level of this impact on hoary and silver-haired bat populations is hard to predict, as there is very little information available regarding the overall population size and distribution of the bats potentially affected. Other regional monitoring studies suggest resident bats do not appear to be significantly affected by wind turbines and almost all mortality is observed during the fall migration period. Also, hoary bat and silver-haired bats, which are expected to be the most common fatalities, are widely distributed in North America.

For the larger region (the 2,600-square mile area described previously), total bat mortality could range from 3,130 to 8,000 bats annually if all of the proposed wind projects are constructed. Overall populations of bats in the region are not well documented, thus conclusions about population effects from turbine mortality would be speculative.

4.7 Vegetation

4.7.1 Impact Levels

Impacts would be considered **high** where actions would:

- Create an unavoidable adverse effect on a federally-listed threatened or endangered plant species;
- Significantly reduce the quantity or quality of a regionally or nationally important botanical reserve, plant population, or similar botanical habitat area;
- Spread noxious weeds due to construction or maintenance; or
- Adversely affect rare or declining species at the regional level.

Impacts would be considered **moderate** where actions would:

- Create an effect on threatened or endangered plant species that could be partially mitigated;
- Temporarily disturb sensitive plants during construction but would not affect the viability of local populations;
- Cause a local reduction in the quantity or quality of vegetation communities (as opposed to regional reductions); or
- Marginally reduce the productivity of adjacent vegetation communities or resources (such as wetland plant communities or botanical reserves).

Impacts would be considered **low** where actions would:

- Create an effect that could be largely mitigated;
- Reduce the quantity or quality of vegetation communities confined to the site of the action;